

amended these claims into their indicated allowable independent form.

In respect to the examiner's objection of claims 1-5, 14-17, 24-25, 27-28, 31, and 53 as being anticipated by Halmosi U.S. Patent 4,043,610, applicant believes that most of these claims differentiate over Halmosi grouser 30 which is symmetrical around its central axis (fig 1). For example Claim 3 states that the two ends are "differentially" angled in respect to a center section: in Halmosi there is a symmetry for the two lateral ends of the grouser shoe. Additional example is claim 4: this claims calls for a center height greater than an end height. In Halmosi all heights are substantially equal (fig 2; col 15 ln 4). Further example claim 5 recites that the second end length is "different" than the first end length. Again, in Halmosi any angling is substantially equal. Other claims also distinguish over Halmosi.

However the applicant has also determined that amending the main independent claims of the present application can clarify the distinctiveness of the preferred embodiment of the presently disclosed invention over Halmosi. The essential basis for this addition is that in the preferred embodiment of the present invention the ends of the grouser bar are angled in respect to a "straight" center section (drawings Fig 2, application page 12 ln 16, pg 13 lns 3-5, pg 14 lns 12-13, pg 26 lns 17-20, etc). This straight center section of the bar 40 is preferably some 40-60% of the total width of the shoe (pg 22 lns 22-24). This straight

section further may be raised in height in respect to the ends (pg 22 ln 24 - pg 23 ln 6). In contrast in Halmosi there is no straight center section: there is instead a V-shaped grouser with an apex formed at the center (Halmosi Figure 1, column 1 lns 9-14, col 2 ln 41, col 3 ln 4).

To clarify the distinctiveness of the preferred embodiment of the present application, the applicant has amended independent claims 1, 14, 24, 27, 28 and 53 to recite a grouser shoe with a bar having a "straight" center section. This differentiates over Halmosi wherein the bar has a V-shape having an apex at the center of the bar. (As previously set forth in the preferred embodiment the present application straight center section is some 40-60% of the total width of the shoe - see for example spec pg 22 lns 23). This action is believed to fully differentiate these independent claims (and those not already allowed dependant thereon) over the cited Halmosi reference.

To place the application into condition for allowance without further ammendment the applicant has cancelled claim 25.

Favorable action is solicited.

Respectfully submitted,

William Lightbody

William S. Lightbody (29,557)

Claim 1. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end, the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center straight section with a center axis, the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar.

Claim 2. The grouser shoe of claim 1 wherein the bar has a second end and characterized in that the second end has a second end axis,

and said second end axis being angled in respect to said center axis to form a second wing at the second end of the bar.

Claim 3. The grouser shoe of claim 1 wherein the bar has a second end and characterized in that the second end has a second end axis, said second end axis being angled in respect to said center axis to form a second wing,

and said second end axis being differentially angled in respect to said center bar than said end axis.

Claim 4. The grouser shoe of claim 1 characterized in that the center of the bar has a center height, the end of the bar

has an end height, and said center height being greater than said end height.

Claim 5. The grouser shoe of claim 2 characterized in that the end has a length, the second end having a second length, and said second length being different than said length.

Claim 6 A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the bar being formed separately from the pad, and the bar and pad being joined to form the shoe.

Claim 7 A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the bar being formed separately from the pad and welded onto the pad.

Claim 8. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the bar being formed separately from the pad with part of the bar being differentially hardened in respect to the pad.

Claim 9. The grouser shoe of claim 7 characterized in that the bar is differentially hardened, and the hardness of the bar approximating that of the pad along the joint thereto.

Claim 10. The grouser shoe of claim 8 characterized in that the bar joints the pad at a joint and the pad has a Rockwell hardness,

said Rockwell hardness being in the range of 30-40 Rc and the bar has a hardness substantially similar to that of the pad at its joint therewith with its hardness increasing substantially uniformly outwardly therefrom to some 50-55 Rc.

Claim 11. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end, the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the bar and pad being formed as a single piece, with the end of the bar being sheared from the pad, bent, and then reattached to the pad to form said wing.

Claim 12. The grouser shoe of claim 11 characterized in that the bar has a second end, with said second end being sheared from the pad, bent, and then reattached to the pad to form a second wing.

Claim 13. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the ends of the bar and pad being attached by welding.

Claim 14. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center straight section with a center axis, both ends of the bar having end axes respectively,

and said end axes being angled in respect to said center axis to form wings at the end of the bar.

Claim 15. A grouser shoe of claim 14 characterized in that said first and second end axes are differentially angled in respect to said center axis.

Claim 16. A grouser shoe of claim 14 characterized in that the bar has a center and two ends, said center and two ends each having a height, and said center height being greater than said end heights.

Claim 17. The grouser shoe of claim 14 characterized in that the two ends have specified lengths, and said specified lengths being different respectively.

Claim 18. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis, both ends of the bar having end axes respectively, and said end axes being angled in respect to said center axis to form wings at the end of the bar, the bar being formed separately from the pad, and the bar and the pad being joined to form the shoe.

Claim 19. The grouser shoe of claim 18 characterized in that the bar is welded onto the pad.

Claim 20. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis, both ends of the bar having end axes respectively, and said end axes being angled in respect to said center axis to form wings at the end of the bar,

the bar being differentially hardened in respect to the pad.

Claim 21. The grouser shoe of claim 20 characterized in that the bar is integral with the pad at a joint and has a hardness, said hardness approximating that of the pad along the joint therewith.

Claim 22. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis, both ends of the bar having end axes respectively, and said end axes being angled in respect to said center axis to form wings at the end of the bar, the bar and pad being formed as a single piece, with the ends of the bar being sheared from the pad, bent, and reattached integrally to the pad to form said wings.

Claim 23. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad, the center of the bar having a center axis, both ends of the bar having end axes respectively,

and said end axes being angled in respect to said center axis to form wings at the end of the bar,

the ends of the bar being welded to the pad to reattach said wings.

Claim 24. A grouser shoe for a tracked vehicle comprising a pad and an integral bar, said bar having a center and two ends, said center having a straight section with center axis and each end having an end axis respectively, and said end axes being angled in respect to said center axis of said straight section to form wings.

Cancel Claim 25. In a grouser shoe having a pad bolted to a drive link via a bolt, the improvement of a bolt protector, and said bolt protector being attached to the pad next to the bolt.

Claim 26. In a grouser shoe having a pad with a leading edge, the improvement of a wear bar, and said wear bar being attached to the pad at the leading edge thereof.

Claim 27. A grouser shoe having a bar with a center and an end, the improvement of the center of the bar being straight and end of the bar being angled in respect to the center of the bar.

Claim 28. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a straight center section and

two ends, bending the ends of the bar in respect to said straight section to form wings, and attaching the wings to the pad.

Claim 29. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the wings to the pad, and forming of the pad separately from the forming of the bar.

Claim 30. A method of claim 29 characterized in that the center and both ends of the bar are fixedly attached to the pad.

Claim 31. A method of claim 28, said method comprising forming the pad and bar as a single piece, and shearing the ends of the bar to form the wings.

Claim 32. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the wings to the pad, forming the pad and bar as a single piece, and shearing the ends of the bar to form the wings, and welding the sheared ends of the bar back to the pad.

Claim 33. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the wings to the pad, and the ends of the bar being bent to form wings of different lengths.

Claim 34. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the wings to the pad, and the end of the bar being bent to form an angle between 10-20⁰ between such end and the center of the bar.

Claim 35. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the wings to the pad, and the ends of the bar being bent to form wings having different angles between the ends and the center of the bar respectively.

Claim 36. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the wings to the pad,

and the grouser shoe being treated to alter the physical properties of the bar.

Claim 37. A method of claim 36 characterized in that the grouser shoe is differentially heat treated such that the bar has a hardness substantially similar to that of the pad at the joint therewith, and said hardness of the bar increases outwardly therefrom.

Claim 38. A method of claim 37 characterized in that the pad has a Rockwell hardness, said Rockwell hardness being typically in the range of 35-40 Rc and the bar has a Rockwell hardness, said Rockwell hardness being some 50-55 Rc at its outer edge.

Claim 39. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece,

separately forming a bar of uniform thickness, the bar having a center and two ends, the center having a center axis and each end having an end axis respectively,

forming wings by bending the ends of the bar to produce an angle between the center axis and each respective end axis to create a bar having a "C" shaped cross section,

and attaching the bar to the pad.

Claim 40. A method of claim 39 characterized in that the wings are of different lengths.

Claim 41. A method of claim 39 characterized in that the angle between the center axis and the respective end axis is preferably between 10-20⁰.

Claim 42. A method of claim 39 characterized in that the wings have different angles between the center axis and each respective end axis.

Claim 43. A method of claim 39 characterized in that the grouser shoe is differentially treated such that the bar has a hardness substantially similar to that of the pad at the joint therewith, and said hardness of the bar increasing outwardly therefrom.

Claim 44. A method of claim 43 characterized in that the pad has a Rockwell hardness of about 35-40 Rc and the bar has a hardness of some 50-55 Rc at its outer edge.

Claim 45. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece and an integral bar,

the bar being of uniform thickness and having a center and two ends, the center having a center axis and each end having an end axis, respectively,

shearing the ends of the bar from the pad,

forming wings by bending the ends of the bar to produce an angle between the center axis and each respective end axis, and reattaching the wings to the pad.

Claim 46. A method of claim 45 characterized in that the wings are of different lengths.

Claim 47. A method of claim 45 characterized in that the angle between the center axis and the respective end axis is preferably between 10-20°.

Claim 48. A method of claim 45 characterized in that the wings have different angles between the center axis and each respective end axis.

Claim 49. A method of claim 45 characterized in that the grouser shoe is differentially treated such that the bar has a hardness substantially similar to that of the pad at the joint therewith, and said hardness of the bar increasing outwardly therefrom.

Claim 50. A method of claim 49 characterized in that the pad has a Rockwell hardness of about 30-40 Rc and the bar has a hardness of some 52-55 Rc at its outer edge.

Claim 51. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece with a leading edge and a trailing edge,

the width of the flat piece preferably being about 60-80% of the length of the pad,

the width of the leading edge preferably being about 10-20% of the length of the pad,

and the width of the trailing edge preferably being about 5-15% of the length of the pad,

separately forming a bar of uniform thickness, the bar having a center and two ends, the center having a center axis and each end having an end axis, respectively,

forming wings by bending the ends of the bar to produce an angle of some $10-20^{\circ}$ between the center axis and each respective end axis creating a bar having a "C" shaped cross section,

heat treating the pad to a hardness of about 35-40 Rc and differentially treating the bar to a hardness of some 50-55 Rc for 75% of its extremity and 35-40 Rc at its inner edge for joining with the pad,

and attaching the bar to the flat piece of the pad.

Claim 52. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece with a leading edge, a trailing edge, and an integral bar,

the length of the flat piece preferably being about 60-80% of the width of the pad,

the width of the leading edge preferably being about 10-20% of the length of the pad,

the width of the trailing edge preferably being about 5-15% of the length of the pad,

the bar being of uniform thickness and having a center and two ends, the center having a center axis and each end having an end axis respectively,

shearing the ends of the bar from the pad,

forming wings by bending the ends of the bar to produce an angle of some $10-20^{\circ}$ between the center axis and each respective end axis creating a bar having a "C" shaped cross section,

reattaching the wings to the pad,

and differentially heat treating the pad to a hardness of about 35-40 Rc and the bar to a hardness of some 50-52 Rc for 75% of its extremity and 35-40 Rc at its joint with the pad.

Claim 53. A method for manufacturing a grouser shoe, said method comprising forming a pad and forming a bar, the bar having a straight center and an end,

including bending said end of the bar in respect to the straight center of the bar to form a wing and attaching said wing to said pad.

In the Abstract:

A grouser shoe for track drives commonly utilized by industrial and commercial equipment (e.g., bulldozers, backhoes, cranes, etc.) including a supportive pad and a ground engaging bar, the ends of such bar being bent to form wings, and method of manufacture thereof. The center portion of the bar provides the primary transmission of driveforce from the vehicle to the ground, while the wings provide for significant reduction in vibration, facilitate steering, provide easier turning, and extend the service life of the grouser shoe.